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2011 Annual Report July 1, 2010 through June 30, 2011

Virginia Institute of Marine Science

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2011 Annual Report
July 1, 2010 through June 30, 2011

Letter from the Dean & Director



During fiscal year 2011, the nation's economy continued to challenge institutions of higher education. Yet, even with reduced resources, VIMS faculty and students continued to achieve national and international recognition. We remain highly successful in competing for grants and contracts despite relatively flat federal and state budgets. Today the Commonwealth of Virginia supports 38% of the VIMS operating budget, and private support is increasingly important for VIMS as it is for universities throughout Virginia and the nation.

Thanks to the work of the VIMS Foundation Board and VIMS Council, and to the generosity of our donors, the VIMS Foundation grew to \$8.6 million in assets as of June 30, 2011, up from \$7.2 million in June 2010. As we go to press, we are pleased to report that significant gifts in the 2011 fiscal year and major gifts and pledges since the start of FY 2012 have increased the assets of the VIMS Foundation to more than \$9.6 million. We are close to reaching \$10,000,000 to mark the 10th year of the VIMS Foundation. Thank you to all who are helping us achieve this goal!

Last year we hosted a number of foreign dignitaries including a delegation from the University of Electronic Science and Technology of China and a delegation from South Korea, which visited to discuss sustainable management of marine resources. Other visiting dignitaries were Virginia Secretary of Natural Resources Doug Domenech,

who learned about key programs in research and advisory service in Chesapeake Bay, and Congressman Rob Wittman, who spoke to the VIMS Council and to the students in the new marine science minor at the College of William and Mary, a program that leverages our combined strengths and was launched with a generous private gift. We also welcomed various delegates and staff members from the General Assembly to update them about the work of VIMS and its importance to our state's natural resources and to the economy.

A notable transition occurred when professor Linda Schaffner was appointed Associate Dean of Academic Studies with oversight of the School of Marine Science and other academic programs at VIMS. She succeeded Dean Iris Anderson, who served with dedication for more than eight years. Linda brings a distinguished scientific career and a deep knowledge of VIMS from her long experience here, first as a graduate student and then as a faculty member. In 2011, we awarded 11 M.S. and 12 Ph.D. degrees. We accepted 15 new and talented students for the 2011-12 academic year.

Faculty and students continued to garner awards and recognition. One example is professor Robert Diaz, internationally known expert on low-oxygen "dead zones," who briefed Congress on the ecological effects of the chemical dispersants in the Gulf oil spill. Another is professor Roger Mann, who testified before the U. S. House of Representatives

on the Chesapeake Bay Accountability and Recovery Act. The Chesapeake Bay Program's Scientific and Technical Advisory Committee (STAC) appointed Dr. Kirk Havens of VIMS to serve as the Committee's Vice Chair and Chair-Elect. STAC members advise the Chesapeake Bay Program, a joint initiative of the federal government and Bay watershed states.

Recent VIMS graduates Lindsey Kraatz and Chris Prosser were honored with prestigious Knauss Fellowships through the National Oceanic and Atmospheric Administration (NOAA) to provide scientific expertise in Washington, D.C. and learn how science is translated into policy. Lindsey will serve as a legislative fellow in the office of U.S. Representative Mike Thompson of California. Chris will serve as an executive fellow on the Nutrients Team in the Ecological and Health Protection Branch of the Environmental Protection Agency.

In the 2010-2011 academic year, gifts from generous donors allowed the VIMS Foundation to support 14 students from 10 endowment funds. In addition, several new fellowships or student awards were established by the Nichols, Olney, and Smith families; by the Tidewater Oyster Gardeners Association; and by the Norfolk Southern Foundation. The VIMS Foundation now has a total of 32 separate endowments in support of our science and education programs.

The summer of 2011 was the third year of five week-long summer camp programs for local



children made possible by an anonymous gift to the VIMS Foundation. Camps were offered to students ranging from first grade through eighth grade. With private support, we also continued our summer intern program at our Eastern Shore Lab in Wachapreague, Virginia, with an exceptionally talented group of high school and college students.

I especially want to thank our energetic volunteer leadership for their devotion to VIMS: Carroll W. Owens, Jr., the President of the VIMS Foundation, has worked with a dedicated board overseeing the Foundation in these extremely challenging times and is helping us take the VIMS Foundation to the next level. L. D. "Rick" Amory serves as Chair of the VIMS Council and led the Council through an interesting year with new industry partnerships and a project to refine the VIMS brand and raise awareness of VIMS and its important contributions to our lives. Comprised of community and business leaders, the Council helps the Institute in numerous ways including partnerships with business and government, communications, and raising critical private dollars.

I also especially thank Council member Thomas E. Gottwald, Chairman of NewMarket Corporation, who hosted an awareness event for us in Richmond recently. Thanks also to Jack Nelson,

Executive Vice President of Altria Corporation and VIMS Council member, who provided a team of marketing experts at his firm to assess and make recommendations about the image and branding of VIMS.

I also want to express heartfelt thanks for the long years of distinguished service to the following members who rotated off the Council in 2011: The Honorable Edward M. Holland; Sara Boyd; Charles Walker; Morgan Massey, former President of the VIMS Foundation; and Carroll W. Owens, Jr., a former Council Chair and current President of the VIMS Foundation. Our thanks go as well to our alumni representatives Elizabeth Hinchey Malloy and Janet Nestlerode and to Maurice Lynch and Linda Schaffner who have helped with alumni outreach and events.

Just recently we lost Cynthia Andrews, a great friend of VIMS and a VIMS Council member for many years. She and her husband the late Virginia Senator Hunter B. Andrews live on at VIMS through their legacy of the H. Booker Andrews, Jr., Graduate Student Fellowship in the VIMS Foundation, honoring their late son, and through the naming of VIMS' Andrews Hall in honor of Hunter Andrews' long-time legislative leadership.

In the last two years, we have focused efforts to reach our short-term goal of \$10,000,000 in assets in the VIMS Foundation. Thanks to a lead gift of \$500,000 from Morgan Massey and the Massey Foundation and other generous donors, we are well on our way to reaching this goal. Just recently, we have received a major gift of \$500,000 from the Nunnally Trust to endow the VIMS Ichthyology Collection, a central piece in the support of our scientific mission. Our first endowments to support work at the VIMS Eastern Shore Lab have also been established recently, one by an anonymous donor and one by VIMS Foundation President Carroll W. Owens, Jr. and his family. We will provide more on these in the next annual report.

Thanks to all who are helping VIMS maintain its leadership in marine research and education in Virginia and the nation, its high level of scientific advice to the Commonwealth, and its commitment to understand and improve the health of the Bay.



John T. Wells



Mr. Thomas E. Gottwald, Chairman of NewMarket Corporation, VIMS Dean and Director John Wells, and William and Mary President Taylor Revelle

Scientific Impact

These selected news stories highlight the many ways in which VIMS researchers use financial support from state, federal, and private sources to help protect and restore Chesapeake Bay and other marine waters around the world.



VIMS researcher David Stanhope (2nd from L) and waterman E.C. Hogge (2nd from R) describe the Ghost Pot Program to U.S. Congressman Rob Wittman (L) and VA Secretary of Natural Resources Doug Domenech (R).



Candace Spier uses the biosensor to take samples on the Elizabeth River. Photo by Mike Unger.



VIMS researchers conduct the Blue Crab Winter Dredge Survey.

"Ghost Pot" removal program has another successful year

Out-of-work commercial watermen hauled up nearly 10,000 derelict "ghost pots" from Chesapeake Bay and its tributaries during the third year of Virginia's one-of-a-kind Marine Debris Removal Program.

The program, initiated and administered by VIMS researchers Kirk Havens, Kory Angstadt, and David Stanhope, paid the watermen to use side-imaging sonar units to detect and retrieve lost or abandoned crab pots and other marine debris that litter the bay floor. Funding is from NOAA through the Virginia Marine Resources Commission.

Many of the recovered pots had been derelict for several years, continuing to inadvertently trap and kill crabs and a variety of fish and wildlife.

Tests show new biosensor can guide environmental clean-ups

Field tests of a new antibody-based "biosensor" developed by VIMS researchers Mike Unger, Steve Kaattari, Candace Spier, and George Vadas show that the device can detect marine pollutants like oil much faster and more cheaply than current technologies. The instrument is small and sturdy enough to be used from a boat.

Their testing shows that the instrument can process samples in less than 10 minutes, detect pollutants at levels as low as just a few parts per billion, and do so at a cost of just pennies per sample. Current technology requires hours of lab work, with a per-sample cost of up to \$1,000.

"Our biosensor combines the power of the immune system with the sensitivity of cutting-edge electronics," says Unger. "It holds great promise for real-time detection and monitoring of oil spills and other releases of contaminants into the marine environment."

Survey shows blue crabs above target for third straight year

The 2010-11 Winter Dredge Survey shows that Chesapeake Bay's blue crab stock continues to rebuild, and is now at its second highest level since 1997.

The results of the survey, conducted annually by VIMS and the Maryland Department of Natural Resources,

indicate that management measures put into place in 2008 to conserve female crabs are continuing to pay dividends for the crab population, the seafood industry, recreational crabbers, and those who just plain enjoy the Bay's favorite crustacean.

Chesapeake Bay's blue crab population now stands at 460 million, nearly double the record low of 249 million in 2007. The harvest of more than 89 million pounds in 2010 was the highest since 1993.

Sutton leads deep-sea survey for Gulf oil spill

The National Oceanic and Atmospheric Administration (NOAA) selected VIMS professor Tracey Sutton to lead a survey of deep-sea life in the Gulf of Mexico as part of the long-term scientific response to the Deepwater Horizon oil spill of 2010.

Sutton was selected for his expertise in the ecology and classification of deep-sea fishes and his experience in mounting deep-sea expeditions. Sutton was a lead scientist for two deep-sea projects during the decade-long Census of Marine Life and has done previous work on the Gulf's deep-sea fishes.

"NOAA realized that there's very little information available for what lives deep in the Gulf," says Sutton, "especially for depths between 700 and 1,400 meters where there was a large plume of oil from the spill. Our job is to gather that information so that they can model the spill's potential impacts."

Orth assists in global analysis of seagrass extinction risk

A team of 21 researchers from 11 nations, including VIMS professor Robert "JJ" Orth, has completed the first-ever study of the risk of extinction for individual seagrass species around the world.

The 4-year study, requested by the International Union for the Conservation of Nature, shows that 10 of the 72 known seagrass species (14%) are at an elevated risk of extinction, while 3 species qualify as endangered.

The authors caution that loss of seagrass species and biodiversity will seriously impact marine ecosystems and human populations. Seagrasses offer critical habitat for aquatic life, clear the water by reducing wave action, absorb excess nutrients, and reduce shoreline erosion.



Orth says that eelgrass was listed as a species of least concern—despite severe declines in Chesapeake Bay—because it is still widespread elsewhere and thrives in less developed areas. He cites his team's successful efforts to replant eelgrass in the seaside bays of Virginia's Eastern Shore as evidence of the species' ability to rebound quickly given clear and cool water.

Public-private partnership aids oyster industry

A joint study by local oyster growers and VIMS professors Kim Reece and Howard Kator shows that moving farmed oysters into saltier waters just prior to harvest nearly eliminates the presence of a bacterium that can sicken humans.

The findings may offer a relatively low-cost solution to a controversial change in FDA regulations that many growers believe will eventually affect the oyster industry in Chesapeake Bay.

Study urges shift in oyster restoration strategies

A study by VIMS professors Ryan Carnegie and Eugene Bureson contends that development of disease resistance among Chesapeake Bay oysters calls for a shift in oyster-restoration strategies within the Bay and its tributaries. Their work is based on 50 years of VIMS research into the prevalence of MSX disease among local oyster populations.

Carnegie says "Our results point to substantial reproduction by disease-resistant oysters in the high-salinity areas where the parasite causing MSX thrives. We thus argue that reefs in areas of higher salinity should be the focus of conservation and restoration efforts, not just those in disease-free lower salinity areas." Current restoration strategies focus on protecting these "low-salinity refugia" as sources of larvae for replenishment of disease-ravaged populations in saltier areas of the Bay.

Bronk team braves icy waters to study Arctic food web

For thousands of years, Inupiat Eskimos have relied on the bounty of nearby coastal waters for their survival along Alaska's far northern shoreline.

VIMS professor Deborah Bronk is now leading a VIMS study of the Arctic coastal ecosystem, and how climate change might affect the supply of nutrients that supports the food web on which native peoples depend.

Bronk's research team is collaborating on the three-year project with colleagues from the University of Georgia and the Skidaway Institute of Oceanography. Funding is from the U.S. National Science Foundation and the Barrow Arctic Science Consortium.

Average winter temperatures in the Arctic have risen more than 7°F during the last 50 years. The extent of Arctic sea ice has decreased by more than 30 % since satellite records began in 1979.

Study suggests a third of shark and ray species are threatened

VIMS emeritus professor Jack Musick has overseen a global study suggesting that 33 % of shark, skate, and ray species are threatened with extinction.

To reduce the threat to cartilaginous fishes, Musick and his co-authors call for a number of conservation actions. These include habitat protection, management of harvest and trade, adoption of new law and policy measures, and enhanced awareness and education campaigns.

The work is part of a major new study of vertebrates by the International Union for Conservation of Nature (IUCN), the world's oldest and largest environmental network.

The IUCN assessment of cartilaginous fishes includes data from the VIMS Shark Survey, which visits Chesapeake Bay and Virginia's coastal waters on a monthly basis from May through October. Established by Musick in 1973, it is now the longest running fishery-independent study of shark populations in the world.



Ryan Carnegie and Nancy Stokes sort oysters at Aberdeen Rock on the York River in spring 2011. Photo by Rita Crockett.

Service to Virginia and the Nation

VIMS faculty and staff help inform policy locally, nationally, and internationally, offering practical solutions for managing fisheries, improving water quality, and restoring marine habitats. Below is a sampling of the many forms of advisory service at VIMS.

Donna Bilkovic is an at-large appointee to the Chesapeake Bay Program's Scientific and Technical Advisory Committee and its Habitat Goal Implementation Team.

Deborah Bronk is President of the Association for the Sciences of Limnology and Oceanography and a member of the Carbon Cycle Science Plan Working Group, the US National Committee for the Intergovernmental Oceanographic Commission, and the Nutrient Criteria Review Panel for the Environmental Protection Agency. She is Treasurer for the Council of Scientific Society Presidents, co-chair of its Committee on Energy and the Environment, and a member of the advisory board for the Centers for Ocean Sciences Education Excellence.

Mark Brush is President-Elect of the Atlantic Estuarine Research Society and serves on the Editorial Board of the *Journal of Sea Research*. He is also a member of the Chesapeake Bay Program's Tidal Monitoring and Assessment Workgroup and Monitoring Re-Alignment Action Team.

Elizabeth Canuel chairs the Geochemical Society's Organic Geochemistry Division and serves as Secretary of Marine Geochemistry for the American Geophysical Union's Ocean Sciences Division.

Ryan Carnegie and colleagues in the VIMS Shellfish Pathology Laboratory conducted 18 certifications for the Virginia shellfish aquaculture industry, a commitment of 800 hours of staff effort to ensure seafood safety. The Lab also sampled 30 Virginia oyster reefs as part of its 22nd annual Fall Survey for oyster diseases with results communicated to the Virginia Marine Resources Commission.

Robert Diaz is a member of advisory panels within the United Nations Environment Program and the U.N. Educational, Scientific and Cultural Organization developing nutrient-reduction strategies to improve coastal environments.

Emmett Duffy serves on the National Geographic Society's Committee for Research and

Exploration, is on the Editorial Board for *Ecology Letters* and the *Journal of Ethology*, and is a member of the Biodiversity Working Group of the Federal Joint Subcommittee on Ocean Science and Technology—Ocean Partnerships.

Mary Fabrizio manages VIMS' juvenile abundance monitoring surveys for fish and blue crabs in Chesapeake Bay.

Carl Friedrichs is an associate editor for *Estuaries and Coasts* and serves on the editorial board of *Continental Shelf Research*. He serves on the steering committees for the Chesapeake Bay Observing System and the Chesapeake Community Modeling Program, and is a member of the Chesapeake Bay Program's Scientific and Technical Advisory Committee.

Marjorie Friedrichs provides guidance to the United Nations concerning the computer models that are used to project the magnitude and rate of climate change. She is also an at-large member of the Chesapeake Bay Program's Scientific and Technical Advisory Committee and on the Steering Committee for its Umbrella Criteria Workshop.

John Graves is Chair of the U.S. Advisory Committee to the International Commission for the Conservation of Atlantic Tunas, and a member of the National Marine Fisheries Service's Highly Migratory Species Advisory Panel. He is also a member of the International Union for the Conservation of Nature's Tuna and Billfish Specialist Group.

Kirk Havens serves as one of two Governor's appointees to the Chesapeake Bay Program's Scientific and Technical Advisory Committee. He serves a similar appointment with the Albemarle-Pamlico National Estuary Program in North Carolina.

Carl Hershner is a member of the Chesapeake Bay Total Maximum Daily Load advisory panel, and provides technical support for the Commonwealth's wetlands and shoreline management programs. He also serves on the Chesapeake Bay Program's Goal Implementation Team, and was a reviewer for

the National Academy of Science's report *Achieving Nutrient and Sediment Reduction Goals in the Chesapeake Bay 2010*. In 2011, he was appointed by Governor McDonnell to the Statewide Advisory Board for the Virginia Water Resources Research Center.

Eric Hilton serves as the Virginia representative to the Atlantic States Marine Fisheries Commission Shad and River Herring Technical Committee and is a member of the Board of Governors of the American Society of Ichthyologists and Herpetologists.

John Hoenig serves on the Science and Statistics committees of the New England and South Atlantic fishery management councils; and on the Tautog Technical Committee, the Striped Bass Tagging Subcommittee, and the Interstate Tagging Committee of the Atlantic States Marine Fisheries Commission. He also serves on the Chesapeake Bay Stock Assessment Committee for the National Marine Fisheries Service's Chesapeake Bay Office.

Rob Latour is Chair of the Menhaden Technical Committee of the Atlantic States Marine Fisheries Commission, and a member of the Scientific and Statistical Committee for the Mid-Atlantic Fishery Management Council.

Mark Luckenbach is a member of the Chesapeake Bay Program's Scientific and Technical Advisory Committee, the Maryland Coastal Bays' Scientific and Technical Advisory Committee, and the Maryland Oyster Commission. He also serves on the TMDL Implementation Committee for Virginia's Department of Environmental Quality and Department of Conservation and Recreation.

Roger Mann testified before the U. S. House of Representatives Subcommittee on Fisheries, Wildlife, Oceans and Insular Affairs concerning the Chesapeake Bay Accountability and Recovery Act and was appointed by Governor McDonnell to the Aquaculture Advisory Board, a division of the Commonwealth's Department of Agriculture and Consumer Services.

Mark Patterson serves on the Steering Committee for the Port and Harbor Security Cluster with Innovate!Hampton Roads, a program of the Hampton Roads Partnership.

Rochelle Seitz participated in Maryland Sea Grant's Quantitative Ecosystem Team for Food Webs to assess ecosystem-based management of striped bass, blue crabs, oysters, menhaden, shad, and herring. She also served as a review editor for the *ICES Journal of Marine Science*.

Jeff Shields is the US delegate to the ICES Work Group on the biology and life history of crabs (ICES = International Council for the Exploration of the Seas).

Walker Smith is editor of *Antarctic Science* and a member of the Scientific Steering Committee for the National Science Foundation's Ocean Carbon and Biogeochemistry Initiative.

Deborah Steinberg is a member of the International Council of Scientific Unions, Scientific Committee on Ocean Research; a trustee of the Bermuda Institute of Ocean Science; and an associate editor for *Deep Sea Research Part I: Oceanographic Research Papers*.

Kam Tang is a member of the Association for the Sciences of Limnology and Oceanography's Diversity Committee.

Troy Tuckey chaired the Alosine species (shad and herring) team for Maryland Sea Grant's Ecosystem Based Fisheries Management project.

Mike Unger is on the Board of Directors for the Elizabeth River Project.

John Wells is Editor-in-Chief of *Marine Geology*, and serves on the Science Board for the Louisiana Coastal Area Ecosystem Restoration Program, and on the Strategic Peer Review Panel for Restoration of Puget Sound.

VIMS helps test nation's first offshore wind turbine

VIMS was chosen in 2010 as the scientific partner for what is likely to be the nation's first offshore wind turbine, a test and demonstration project planned for an area west of Cape Charles in lower Chesapeake Bay.

If permitting proceeds as expected in 2012, Gamesa Energy will erect the 275-foot prototype wind-

turbine generator by the third quarter of 2013. This next-generation, 5-megawatt offshore turbine will serve as a test structure for learning how to adapt wind-power technology for the oceanic conditions of U.S. territorial waters.

Development of the Commonwealth's offshore wind resources is a major goal of both Governor Bob McDonnell and the General Assembly, which in 2010 created the Virginia Offshore Wind Development Authority.

VIMS, a charter board member of the Virginia Coastal Energy Research Consortium, partnered with ESS Group, Inc. to help select the best general location for the offshore turbine and its associated submarine cable system during the project's first phase, and is now providing vessel support and additional scientific expertise as project partners conduct geophysical and other tests to identify the exact site for turbine placement. The Institute also anticipates providing continuing scientific services during the turbine's construction and operation.

The VIMS team is led by Assistant Director for Advisory Services Lyle Varnell and includes researchers Chris Bonzek, Bob Diaz, Carl Friedrichs, Scott Hardaway, and Rob Latour.

VIMS collaborates with industry partners to monitor fish stocks

VIMS researchers continued working with commercial fishermen to collect and share fisheries data, with the mutual goal of ensuring sustainable and profitable fisheries in the Mid-Atlantic and New England regions.

The VIMS team, led by Rob Latour, Chris Bonzek, and Jim Gartland, is a key part of NEAMAP—the NorthEast Area Monitoring and Assessment Program.

Since 2007, the VIMS team has partnered for one spring and one fall survey each year with the crew of the fishing vessel *Darana R*, a 90-foot commercial trawler out of Hampton. The boat is captained by Jimmy Ruhle of Wanchese, North Carolina.

Each survey keeps the team at sea for 4-5 weeks, trawling at 150 randomly selected sites in inshore waters from Cape Hatteras north to Cape Cod. All told, they've spent 262 days at sea during the last 4 years, plus countless hours in the lab at VIMS processing samples and analyzing data.

Their data—recording factors such as length, weight, age, sex ratio, and diet—are used to

help manage commercially and recreationally important species throughout the coastal waters of the northeastern U.S. NOAA's latest estimate of the annual ex-vessel value of commercial landings from these waters is \$283 million.

VIMS study helps Commonwealth sustain shoreline resources

A comprehensive study by VIMS' Center for Coastal Resources Management (CCRM) will help the Commonwealth move toward sustainable management of its tidal shorelines in the coming years.

The study was in response to a 2010 joint resolution by the Virginia Senate that mandated VIMS to investigate and compare tidal shoreline management programs in Virginia and other nearby states. The goal is to make the Commonwealth's programs more efficient and effective while also promoting living shorelines and other "green" options for management of coastal resources. Living shorelines are an alternative to traditional bulkheads that reduce erosion and enhance wetland habitat.

The CCRM report identifies several regulatory changes that would reduce the cost and time required to issue shoreline permits; suggests regulatory innovations that would increase adoption of living shorelines; and makes specific recommendations to achieve the sustained protection of tidal shoreline resources.

Awards and Recognition

Faculty

Deborah Bronk and **Walker Smith** were among 20 exceptional William & Mary faculty members receiving prestigious Plumeri Awards for Faculty Excellence in 2011. The awards, now in their third year, recognize faculty members' exemplary achievements in teaching, research, and service.

Eugene Bureson received the prestigious Mathias Medal from Virginia Sea Grant for his lifelong contributions to Chesapeake Bay science and policy, most notably in shellfish pathology, monitoring oyster diseases, and providing information critical for developing oyster-management strategies.

Elizabeth Canuel was among 20 environmental scientists from the U.S., Canada, and Mexico awarded an Aldo Leopold Leadership Fellowship for 2011. The Leopold program provides academic researchers with the skills and connections they need to be effective leaders and communicators.

Robert Diaz received one of four Outstanding Scientist awards for Virginia for 2010. The award is bestowed annually by the Governor's Office and the Science Museum of Virginia to honor those whose contributions to scientific research have extended the boundaries of their own and other fields. Diaz is the international "go-to guy" for information on the ecological effects of low-oxygen "dead zones" in the world's oceans and Chesapeake Bay.

Emmett Duffy was honored with the inaugural Kobe Award from the Suma Aqualife Park in Japan for his achievements in marine ecology, with special mention of his discovery of "eusociality" among shrimps.

Mary Fabrizio was named the Moses D. Nunnally Distinguished Associate Term Professor of Marine Science.

John Graves was honored by *Sport Fishing* magazine with one of its inaugural Making a Difference awards for his contributions to saltwater recreational angling.

Mark Patterson received the inaugural Member of the Year award from the Association for Unmanned Vehicle Systems International for his work in advancing unmanned systems through industry innovation.

Harry Wang and colleagues won a prestigious Governor's Technology award for their leading role in developing and applying the Chesapeake Bay Inundation Prediction System. Their cutting-edge computer model helps predict storm-tide flooding of the Chesapeake Bay shoreline and aids in planning for sea-level rise.

Staff

Margaret Pizer of Virginia Sea Grant and **Lisa Lawrence** of VIMS' Marine Advisory Program were awarded a BoatUS Recreational Boating Access Award for their work on the "Accessing the Virginia Coast" website, which provides a wealth of information on issues related to public access to Virginia's waterways.

VIMS Service Awards

Facilities/Safety/Trades

Mr. Ron Herzick

Research/Advisory Service

Mr. Tom Murray

Technical Support

Mr. Ed Keesee

Administrative Support

Ms. Linda Ward

Outstanding Professionals Award

Ms. Diane Walker

Outstanding Faculty Teaching Award

Dr. Elizabeth Canuel

Robert M. Freeman Volunteer of the Year Award

Ms. Kelsey Bryant



Troy Hartley, Director of VA Sea Grant, with VIMS emeritus professor Eugene Bureson, winner of the Mathias Medal.



Dr. Harry Wang (2nd from L) with fellow winners of the Governor's Technology Award. Photo by C. Reilly.



Dr. Bob Diaz (L) accepts an Outstanding Scientist Award from Lt. Governor Bill Bolling.

Grants and Contracts

VIMS researchers were awarded \$21 million by federal, state, and private entities during fiscal year 2010-2011. In addition to supporting critical research and oversight activities within the Commonwealth, these single and multi-year grants and contracts provided opportunities to enhance educational programs and conduct cutting-edge research nationally and internationally. A few highlights include:

Donna Bilkovic and **Molly Roggero**, "Comprehensive Monitoring of Ecological and Erosion Protection Functions of Chesapeake Bay Living Shorelines," Chesapeake Bay Trust, \$50,000

Deborah Bronk, "Collaborative Research: Synergistic Effects of Iron, Carbon Dioxide and Temperature on the Fate of Nitrate: Implications for Future Changes in Export Production in the Southern Ocean," National Science Foundation, \$476,668

Ryan Carnegie, "Influence of Oyster Reef Elevation on the Health of *Crassostrea virginica*," National Oceanic and Atmospheric Administration, \$45,825

J. Emmett Duffy, "Biodiversity and Complex Environmental Forcing of Ecosystem Functioning in the Marine Foundation Species, Eelgrass: A global Experimental Network," National Science Foundation, \$596,1281

J. Emmett Duffy, **Mark Luckenbach** and **Robert Orth**, "Opening the Bottleneck in Bay Scallop Restoration: The Role of Micropredators," National Oceanic and Atmospheric Administration, \$44,238

Carl Friedrichs, **Courtney Harris** and **Marjorie Friedrichs**, "Improved Observation, Modeling, Analysis and Understanding of Fine Sediment Dynamics in Turbid, Biologically Active Environments," National Science Foundation, \$644,025

Marjorie Friedrichs, "Impacts of Changing Climate and Land Use on Carbon Cycling and Budgets of the Coastal Ocean Margin: Observations, Analysis, and Modeling," National Aeronautics and Space Administration, \$344,949

John Graves and **Rebecca Dickhut**, "Use of Organochlorine Tracer Analysis to Determine the Magnitude and Temporal Variation of Mixing Rates of Eastern and Western School Size Bluefin Tuna in the Western Atlantic Recreational Fishery for School Bluefin Tuna," National Oceanic and Atmospheric Administration, \$255,096

Courtney Harris, "Shelf-Slope Sediment Exchange in the Northern Gulf of Mexico: Application of Numerical Models for Extreme Events," Bureau of Offshore Energy Management, Regulation, and Enforcement (BOEMRE), \$220,625

Kirk Havens, "National Wetlands Assessment," Environmental Protection Agency, \$144,300

Carlton Hershner, "Assessing Regulatory Fidelity to Guidance in Virginia's Tidal Wetlands Management," Environmental Protection Agency, \$168,224

Howard Kator and **Kimberly Reece**, "Study of Adenovirus and its Infectivity in Wastewater Treatment Plant Effluent," National Oceanic and Atmospheric Administration, \$30,528

Robert Latour, "CAMEO: Collaborative Research: Patterns of Connectivity in Northwest Atlantic Fishery Ecosystems," National Science Foundation, \$117,612

Robert Latour, **Roger Mann** and **Mary Fabrizio**, "Climate Change and the Fisheries Food Web in the Chesapeake Bay and Coastal Atlantic Ocean," Virginia Environmental Endowment, \$87,000

Jerome Maa and **Carl Hobbs**, "Measurements of Mud Rheological Properties, an Ultrasonic Approach," Korean Oceanographic Research and Development Institute, \$28,820

Jan McDowell and **John Graves**, "Development of a Suite of High-Throughput Molecular Markers for Genetic Monitoring, Genetic Tagging and Population Genetics in Bluefin Tuna," National Oceanic and Atmospheric Administration, \$210,153

Thomas Murray, "Mariculture, FY11," Virginia Marine Resources Commission, \$50,000

Kimberly Reece, **Ryan Carnegie** and **Wolfgang Vogelbein**, "Assessing the Impacts of Emerging Harmful Algal Bloom Species on Shellfish Restoration and Aquaculture in Chesapeake Bay," National Oceanic and Atmospheric Administration, \$39,980

Linda Schaffner and **Rochelle Seitz**, "REU Site: Coastal Marine Science Undergraduate Research Opportunities at the Virginia Institute of Marine Science," National Science Foundation, \$674,224.

Walker Smith, "Collaborative Research: Impact of Mesoscale Processes on Iron Supply and Phytoplankton Dynamics in the Ross Sea," National Science Foundation, \$365,203

Wolfgang Vogelbein and **Michael Unger**, "Elizabeth River Biological Effects & Sediment Chemical Contaminant Monitoring 2010: Swimming Point Site Pre-Remediation," Elizabeth River Project, \$12,579

School of Marine Science

Graduate students in the School of Marine Science at VIMS have an unparalleled opportunity to conduct research that benefits society, with many pursuing studies that involve collaborations with industry and management agencies at the state, regional, and international levels. Here are some highlights of accomplishments by the 109 students enrolled during the fall quarter of 2010. A full list of recent theses and dissertations is available at vims.edu/library.

External Student Awards

Samantha Bickel received a Ph.D. Fellowship in Freshwater Science from the Leibniz-Institute of Freshwater Ecology & Inland Fisheries in Berlin, Germany.

Sarah Cammer was awarded a Graduate Research Fellowship from the National Estuarine Research Reserve program.

Patrick Lynch earned a Sea Grant Fellowship in Population Dynamics from the National Oceanic and Atmospheric Administration.

Jennifer Martin received a Chancellor's Faculty Fellowship award from the Virginia Community College System.

Itchika Sivaipram was awarded a Royal Thai Fellowship from the Government of Thailand.

Lori Sutter received an Exploration & Field Research grant from the Explorers Club of Washington, D.C. and a Coastal Wetland Studies Scholarship from the Garden Club of America.

Amy Then was awarded an Academic Training Scheme for Institutes of Higher Learning Fellowship from the Malaysian American Commission on Educational Exchange.

Ana Verissimo earned a Ph.D. Scholarship from the Portuguese Science & Technology Foundation.

Yongjin Xiao earned an Earth and Space Science Fellowship from the NASA Earth & Space Science Fellowship Program.

Best Student Papers

Master's

Juliette Giordano, Mark Brush, and Iris Anderson. 2011. Quantifying annual nitrogen loads to Virginia's coastal lagoons: sources and water quality response. *Estuaries and Coasts*.

Ph.D.

David Elliott, Courtney Harris, and Kam Tang. 2010. Dead in the Water: The fate of copepod carcasses in the York River estuary, Virginia. *Limnology & Oceanography*.

Student Research Highlights

Jellyfish blooms alter marine food webs

Jellyfish can be a nuisance to bathers and boaters in Chesapeake Bay. A study led by recent VIMS Ph.D. graduate Rob Condon shows that they also have a more significant impact, drastically altering marine food webs by shunting food energy toward bacteria, and away from the fish and shellfish that humans like to eat.

"Jellyfish are voracious predators," says Condon. "They impact food webs by capturing plankton that would otherwise be eaten by fish and converting that food energy into gelatinous biomass. This restricts the transfer of energy up the food chain, because jellyfish are not readily consumed by other predators."

An apparent increase in the size and frequency of jellyfish blooms in coastal and estuarine waters around the world during the last few decades means that jellies' impact on marine food webs and seafood availability is likely to increase into the future.

VIMS grad student organizes first-ever statewide terrapin survey

During summer 2011, VIMS Ph.D. student Diane Tulipani organized a statewide, volunteer-based survey of diamondback terrapins, a unique species of brackish-water turtle whose numbers are thought to be in decline due to habitat loss, nest predation, and drowning in crab pots.

Tulipani's "TerpSearch" was the first-ever comprehensive study of diamondback terrapin

populations in Virginia, and could lead to more effective management of activities that contribute to terrapin mortality in the Commonwealth. Tulipani plans a second survey season for summer 2012.

Tulipani hopes that the project will serve as a model for similar citizen-led surveys in other states that these turtles call home. Terrapins inhabit coastal bays, estuaries, and salt marshes from Massachusetts to Texas.

Genetic markers help enforce seafood regulations

Master's student Laurie Sorenson made new discoveries in "marine forensics" that will allow federal seafood agents to genetically test blue marlin to quickly and accurately determine their ocean of origin.

The test is needed to ensure that the blue marlin sold in U.S. seafood markets were not taken from the Atlantic Ocean. The import and sale of blue marlin from the Pacific or Indian oceans is legal in the U.S., while the marketing of Atlantic blues can bring civil or criminal penalties. Regulation of Atlantic blue marlin reflects overfishing and a troubling drop in population within Atlantic waters.

Sorenson developed the new tests in collaboration with molecular biologist Jan McDowell and advisor John Graves, who chairs the U.S. Advisory Committee to the International Commission for the Conservation of Atlantic Tunas (ICCAT).

"The new test provides more power to discriminate Atlantic and Indo-Pacific blue marlin," says Sorenson. "It uses a suite of markers to identify a sample's ocean of origin with enough accuracy to be able to enforce the prohibition on the sale of Atlantic blue marlin."

VIMS pair selected as Knauss Fellows

VIMS graduate students Lindsey Kraatz and Chris Prosser were honored with prestigious Knauss Fellowships through the National Oceanic and Atmospheric Administration (NOAA) to provide scientific expertise in Washington, D.C. and learn how science is translated into policy.

Kraatz will serve as a legislative fellow in the office of U.S. Representative Mike Thompson of California. Prosser will serve as an executive fellow on the Nutrients Team in the Ecological and Health Protection Branch of the Environmental Protection Agency.

Of the 65 students from institutes of higher education in Virginia who have served as Knauss fellows since the program began in 1979, 39 (60%) have hailed from William and Mary's School of Marine Science at VIMS.

REU program benefits graduate studies at VIMS

The National Science Foundation has renewed the Research Experience for Undergraduate (REU) program at VIMS for another five years. The program, managed by Associate Dean of Academic Studies Linda Schaffner and professor Rochelle Seitz, is now in its 22nd year.

The VIMS REU program brings undergraduates from around the nation to the VIMS campus each summer for 10 weeks of hands-on research experience in coastal marine science. VIMS faculty and graduate students mentor the students during their stay.

The most recent renewal of the VIMS REU program increases the number of students accepted each summer from 10 to 12. Schaffner says "We upped the request with a specific intent of making more room for W&M undergraduates

who are interested in pursuing the new marine science minor."

Schaffner notes that the REU program serves as an excellent "feeder" program for the graduate program at VIMS. "Recent REU alumni admits include some of our most talented students," she says.

The program is specifically designed to increase the participation of underrepresented groups in the ocean sciences. A 2010 survey of former students shows that 66% of under-represented alumni and 82% of well-represented alumni have gone on to pursue careers or higher degrees in science or engineering.



The REU class of 2011.



A pair of jellyfish join the Parade of Marine Life during Marine Science Day.



Williamsburg Inn apprentice Ryan Manning (L) assists Chef Brent Wertz during the annual Chef's Seafood Symposium.



The October Mad Lab brought a glow to guests.

Outreach

VIMS outreach programs reached nearly 10,000 individuals through events designed to inform and engage adults, families, students, educators, watermen and fishermen, government staff, marine industry workers, and policymakers. More than 3,500 kindergarten through 12th-graders participated in marine-related classroom activities and tours of VIMS. We also reached nearly 3,000 subscribers through our monthly e-Tidings newsletter, and had 865 friends like us on Facebook.

Marine Science Day

Nearly 2,500 people visited VIMS' annual open house on May 21 to enjoy a behind-the-scenes look at how our research and advisory activities help empower Virginians to protect and restore Chesapeake Bay and the coastal ocean. More than half were first-time visitors.

After Hours Lectures

Are blue crabs on the rebound?

(May 12, 2011) VIMS professor Rom Lipcius explored the science and management actions behind the recent upsurge in blue crabs in Chesapeake Bay.

Blizzards and heat waves and floods, oh my!

(March 31, 2011) NASA climate scientist Bruck Wielicki explained how recent weather extremes fit within the broader context of global climate change.

A decade of discovery

(February 24, 2011) VIMS professor Tracey Sutton described the Census of Marine Life, a 10-year effort to assess the diversity, distribution, and abundance of marine life around the globe.

A "pollution diet" for Chesapeake Bay: Fad or fitness?

(January 27, 2011) VIMS professor Carl Hershner explored the issues surrounding the "total maximum daily loads" being developed by the U.S. Environmental Protection Agency as part of the Chesapeake Bay Agreement.

The Gulf Oil Spill: A report from the front lines

(October 28, 2010) VIMS alumnus Dr. Don Boesch, a member of the President's BP Deepwater Horizon Oil Spill Commission, explored the impacts and consequences of this massive spill in the Gulf of Mexico.

Mercury: A hazard without borders

(September 30, 2010) W&M professor Dan Cristol described mercury's effects and behavior in natural systems, with a focus on his study of mercury contamination in birds.

Sharks: Dangerous or endangered?

(August 26, 2010) VIMS professor Tracey Sutton explored the natural history of sharks and the management status of shark populations in coastal Virginia and Chesapeake Bay.

Energy choices and the Bay

(July 29, 2010) W&M alumnus Dr. Chris Pyke, Director of Research at the U.S. Green Building Council, explored how our energy choices and their climatic consequences will affect Chesapeake Bay.

Discovery Labs

Penguins, plankton & more!

(June 28, 2011) VIMS professor Debbie Steinberg took participants on a virtual voyage to examine the marine life of Antarctica.

Aquaculture

(April 19, 2011) Dan Sennett of Virginia Sea Grant explored the farming of oysters and other species in Chesapeake Bay.

What's lurking in the deep?

(March 22, 2011) Audience members explored the deep-sea life of Norfolk Canyon with VIMS graduate student Todd Clardy.

I want to be a marine scientist

(February 22, 2011) Lisa Lawrence of the Marine Advisory Program at VIMS helped guests explore careers in marine science.

Sharks!

(January 25, 2011) Participants learned about shark biology with Chris Crippen of the Virginia Living Museum.

Chesapeake Bay at night

(October 19, 2010) Audience members took a spooky look at bioluminescence and nocturnal animals.

Sustainable seafood

(August 17, 2010) Vicki Clark of the Virginia Sea Grant Marine Advisory Program at VIMS gave participants the opportunity to prepare and eat local seafood.

Unique Fishes of the Bay

(July 20, 2010) Hank Brooks of the VIMS Trawl Survey investigated the unique fishes that inhabit Chesapeake Bay.

Guided Tours

Guided tours gave more than 400 adults and older children a behind-the-scenes look at VIMS. Tours typically included a visit to the VIMS Visitor's Center and Aquarium, a research laboratory, the Fisheries Collection, and the Teaching Marsh.

Speakers Bureau

VIMS faculty and staff presented 15 invited talks to more than 500 citizens at community organizations throughout Hampton Roads and the Northern Neck.

Festivals and Fairs

Staff, students, and faculty interacted with more than 1,200 people from a VIMS-sponsored booth during 7 public events, including the Urbanna Oyster Festival, the Watermen's Heritage Festival, and the Gloucester Daffodil Festival.

Science Under Sail

In June 2011, VIMS began a unique new partnership with Yorktown Sailing Charters LLC and their 105-foot schooner *Alliance*, offering two-hour "Science Under Sail" cruises on the York River featuring guest scientists from VIMS.

VIMS Dean and Director John Wells says the partnership "offers a wonderful opportunity for VIMS scientists to share their knowledge of Chesapeake Bay and its marine life with the public in a unique new setting."

During the inaugural season, VIMS scientists shared knowledge on topics ranging from Bay water quality and shoreline management to sea turtles, oysters, sea grasses, jellyfish, zooplankton, marine pollution, and derelict or "ghost" crab pots. The seasonal program will start up again in spring 2012.

No Children Left Inside

Seventh graders and their teachers in Gloucester, Mathews, and York counties are part of a newly expanded educational program offered by the Chesapeake Bay National Estuarine Research Reserve at VIMS. The program is led by CBNERR Education Coordinator Sarah McGuire.

The 2011 program was the first to target middle schools in York County. Each year between 2005 and 2010, it reached all 7th-grade students at Page and Peasley middle schools in Gloucester County and Thomas Hunter Middle School in Mathews County.

"The Chesapeake 2000 Agreement mandated that all students must have a meaningful Chesapeake Bay watershed experience before they graduate from high school," says McGuire. "Our program, Chesapeake Studies for Virginia Middle Schools, does just that."

The program is funded by a series of one-year grants from NOAA's B-WET Program (for Bay Watershed Education and Training). In 2010-11, the VIMS B-WET program reached more than 1,000 students: 650 in Gloucester and Mathews County and 560 in York County. During its 6-year run to date, the program has reached more than 3,200 young learners.

The program combines a full-day field trip to VIMS, a pair of visits by CBNERR scientists to the student's own biology classrooms, and ongoing instruction by the students' regular life-science teachers. Teacher training ensures that the program will continue into future years.



Researcher Karen Duhring with visitors during a tour of the VIMS Teaching Marsh.



Science Under Sail takes place aboard the schooner *Alliance*.



Graduate student Lauren Nys as Dr. C. Horse during the Wallerpalooza Festival in Williamsburg.

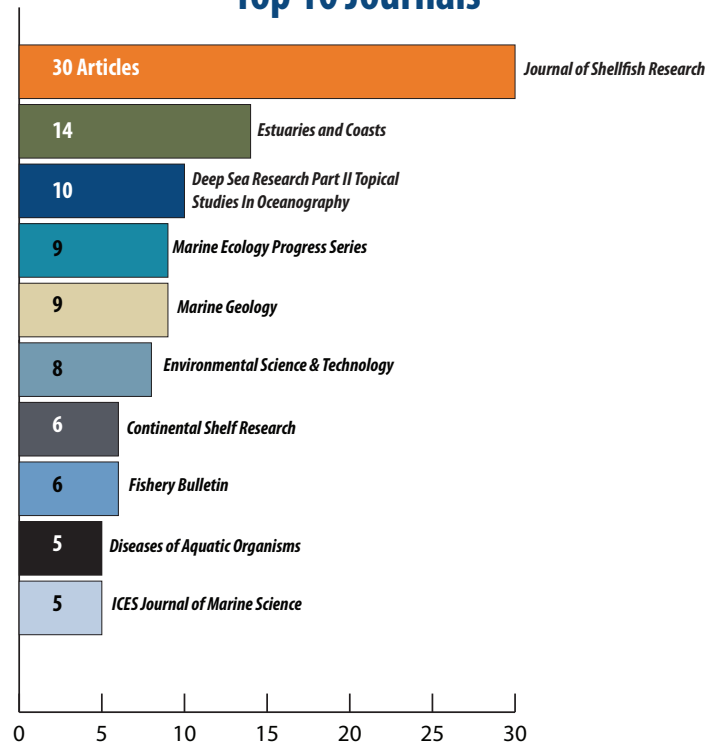


CBNERR Education Coordinator Sarah McGuire with a local 7th grader.

Publications

VIMS researchers published 206 peer-reviewed research articles and 11 review papers between January 2010 and December 2011. Here's a snapshot of these and other VIMS publications. All information is taken from Thomson Reuters® Web of Science. A full list of VIMS-authored journal articles is available at vims.edu/library.

Top 10 Journals



Faculty Books

Bianchi, T. S., & Canuel, E. A. (2011). Chemical Biomarkers In Aquatic Ecosystems. Princeton: Princeton University Press.

Newman, M. C. (2010). Fundamentals of Ecotoxicology (3rd ed.). Boca Raton: CRC Press.

Carrier, J. C., Musick, J. A., & Heithaus, M. R. (2010). Sharks and Their Relatives II: Biodiversity, Adaptive Physiology, and Conservation. Boca Raton: Taylor & Francis.

Milliman, J.D., & Farnsworth, K.L. (2011) River Discharge to the Coastal Ocean: A Global Synthesis. New York: Cambridge University Press.

Major Review Articles

Behringer D. C., M. J. Butler, J. D. Shields, and J. Moss. 2011. Review of *Panulirus argus* virus 1-a decade after its discovery. *Diseases of Aquatic Organisms* 94:153-160.

Chen D., R. C. Hale. 2010. A global review of polybrominated diphenyl ether flame retardant contamination in birds. *Environment International* 36:800-811.

Hofmann E. E., B. Cahill, K. Fennel, M. A. M. Friedrichs, K. Hyde, C. Lee, A. Mannino, R. G. Najjar, J. E. O'Reilly, J. Wilkin, and J. Xue. 2011. Modeling the dynamics of continental shelf carbon RID A-7470-2009 RID E-5343-2011. *Annual Review of Marine Science* 3 3:93-122.

Lomas M. W., D. A. Bronk, and G. van den Engh. 2011. Use of flow cytometry to measure biogeochemical rates and processes in the ocean. *Annual Review of Marine Science* 3 3:537-566.

Musyl M. K., M. L. Domeier, N. Nasby-Lucas, R. W. Brill, L. M. McNaughton, J. Y. Swimmer, M. S. Lutcavage, S. G. Wilson, B. Galuardi, and J. B. Liddle. 2011. Performance of pop-up satellite archival tags. *Marine Ecology-Progress Series* 433:1-U58.

Najjar R. G., C. R. Pyke, M. B. Adams, D. Breitburg, C. Hershner, M. Kemp, R. Howarth, M. R. Mulholland, M. Paolisso, D. Secor, K. Sellner, D. Wardrop, and R. Wood. 2010. Potential climate-change impacts on the Chesapeake Bay RID E-8480-2011. *Estuarine Coastal and Shelf Science* 86:1-20.

Shields J. D. 2011. Diseases of spiny lobsters: A review. *Journal of Invertebrate Pathology* 106:79-91.

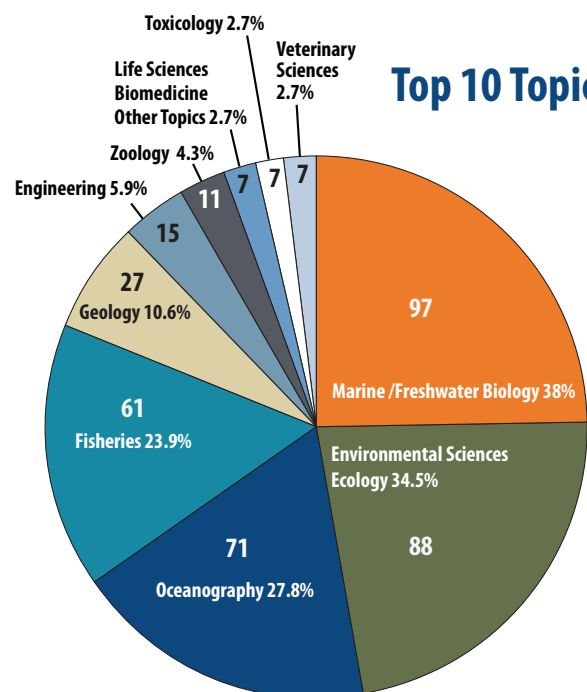
Small H. J., K. M. Pagenkopp. 2011. Reservoirs and alternate hosts for pathogens of commercially important crustaceans: A review. *Journal of Invertebrate Pathology* 106:153-164.

Smith W. O., V. Asper, S. Tozzi, X. Liu, and S. E. Stammerjohn. 2011. Surface layer variability in the Ross Sea, Antarctica as assessed by in situ fluorescence measurements. *Progress in Oceanography* 88:28-45.

Tang K. W., V. Turk, and H. Grossart. 2010. Linkage between crustacean zooplankton and aquatic bacteria. *Aquatic Microbial Ecology* 61:261-277.

Ye J., E. Bromage, I. Kaattari, and S. Kaattari. 2011. Transduction of binding affinity by B lymphocytes: A new dimension in immunological regulation. *Developmental and Comparative Immunology* 35:982-990.

Top 10 Topics



Giving Highlights

Private Giving Benefits Students and Research

In recognition of the 10th year of the VIMS Foundation, we set a goal to bring the Foundation's assets to \$10 million, up from \$7.2 million as of June of 2010. Thanks to the support of many donors, we are well on our way to that goal, having reached \$8.6 million as of June 2011, and more than \$9.6 million as of December 2011. We hope to reach the goal by the end of the current fiscal year in June 2012.

Private giving currently accounts for a small but growing percentage of VIMS' support, and will be increasingly important to our operations in the future, especially for student support and the purchase of scientific equipment and other research costs.

VIMS receives gifts directly as well as through the VIMS Foundation. Endowments created in the last decade have begun to benefit our education and research programs, and expendable gifts for current needs, such as scientific instruments or research programs, are also making a difference. Private giving to VIMS and the VIMS Foundation in FY 2011 amounted to 495 gifts totaling \$855,162. Of this, \$601,580 came through the VIMS Foundation. When outstanding pledges to the Foundation are added, the total raised for the VIMS Foundation in FY 2011 is \$1,075,795.

Today the VIMS Foundation has 32 separate endowments. In FY 2011, 10 of these endowments provided sufficient investment income to support 14 students. In addition, several new endowments have been started or pledged since the end of the 2011 fiscal year. Income from these new endowments will be available to support VIMS in future years. Funds endowed in the VIMS Foundation are invested with the William and Mary Investment Trust (WAMIT), a vehicle that is open to various foundations affiliated with the College of William and Mary. Investment results are summarized elsewhere in this report.

We deeply appreciate the support of the many friends, alumni, foundations, and corporations listed here. Friends of VIMS are people who care about Chesapeake Bay and our environment and understand the vital role VIMS plays in advising the Commonwealth, detecting problems in our waters and identifying solutions, and in educating the next generation of scientific leaders. Our impact, as an Institute and through our graduates, is regional, national, and global, as marine science knows no bounds.

If you would like to make a gift to the VIMS Foundation or to include it in your estate plans to benefit faculty, students, and the work of VIMS, please call Dean and Director John Wells at 804.684.7102 or Anne Marshall, Director of Development and Executive Director of the VIMS Foundation at 804.684.7107.

TOGA endows fellowship at VIMS

The Tidewater Oyster Gardeners Association (TOGA) has provided the VIMS Foundation with an initial gift of \$27,000 to establish the TOGA Fellowship Endowment. When fully endowed, the fellowship will support research by graduate students in the College of William and Mary's School of Marine Science at VIMS.

The endowment honors two exceptional contributors to TOGA, VIMS fisheries specialist Mike Oesterling and Ms. Jackie Partin. Oesterling, who retired in 2011 after a 30-year career with VIMS and Virginia Sea Grant, served as the Institute's liaison with TOGA and led the popular Master Oyster Gardener course. Partin is a TOGA founder and past president.

TOGA established the endowment to support research on oysters, other shellfish, and Chesapeake Bay restoration. The association intends to fully fund its endowment through future fundraising efforts, and to continue to increase the endowment base beyond the required \$50,000 minimum. Mr. Don Beard, a leading member of the Northern Neck Oyster Gardeners Association, made significant contributions to the original endowment.

VIMS Dean and Director John Wells says "VIMS is deeply thankful for TOGA's generous gift, which further strengthens the long-standing ties between our organizations and will help in training the next generation of marine scientists to restore oysters to a healthy Bay."



Members of the Tidewater Oyster Gardeners Association announced the establishment of the TOGA Fellowship Endowment during a visit to the Virginia Institute of Marine Science. From L: VIMS Dean and Director John Wells, TOGA co-founder and past president Jackie Partin, recently retired VIMS fisheries specialist Mike Oesterling, endowment contributor Don Beard, and TOGA president David Turney.

Gloucester Point Rotary Club honors Warinner with gift to VIMS

The Rotary Club of Gloucester Point made a \$5,000 gift to the VIMS Foundation to honor emeritus professor J. Ernest Warinner and to support graduate student research and scholarship in the College of William and Mary's School of Marine Science at VIMS.

The "J. Ernest Warinner Gloucester Point Rotary Club Graduate Student Fellowship" is the result of a fundraising effort among club members through the Gloucester Point Rotary Charitable Foundation. The funds were used to award individual \$2,500 fellowships to Masters' students Annie Murphy and Anna Mosby.

Rotary Club president Rodney Hockaday says "We're greatly pleased to establish this partnership with VIMS in honor of Ernie, a beloved and valued colleague and fellow Rotarian."

Warinner, who received his Master's degree from VIMS in 1962 and retired as an adjunct assistant professor in 1991, was a leader in studying the effects of chemical contaminants on marine life in Chesapeake Bay.

Van Engel Fellowship supports blue crab research

Professor Willard A. Van Engel spent his academic career at VIMS building a crustacean ecology program. After his retirement, leadership in the program passed to professor Romauld Lipcius. The program is internationally recognized for excellence in studies of the ecology, population dynamics, and conservation of blue crabs in Chesapeake Bay.

During his years at VIMS and into his retirement, Willard endowed a Fellowship for student support in studies of crustacean ecology through a private foundation, the Willard A. Van Engel Fellowship, Inc. The recipient of the 2011 Van Engel Fellowship was doctoral student Gina Ralph. The fellowship supports her dissertation research, which focuses on identifying nursery habitats for blue crabs in Chesapeake Bay and quantifying how these habitats influence the crabs' population dynamics.

Dominion funds underwater video system

The Dominion Foundation, the philanthropic arm of Dominion Resources, Inc., has donated \$50,000 to VIMS for purchase of an underwater video system for field studies in Chesapeake Bay.

The first use of the multi-camera system will be to quantify the number and behavior of blue crabs foraging on restored oyster reefs—an important measure of the success of reef restoration.

The video system—which can be deployed for weeks at a time with multiple options for lighting, image capture, and image retrieval—will be operated by professor Rom Lipcius and doctoral student Allison Colden, as well as other graduate students in the labs of Lipcius and professor Rochelle Seitz.

Lipcius says, "We've long had a need for a way to acquire high-quality video images from nursery and foraging habits in the Bay, where light and visibility are often limited. We're very excited about the opportunities provided by Dominion's generous gift."

Pamela Faggert, Vice President and Chief Environmental Officer of Dominion Resources Services, Inc., says "VIMS is a great resource for all of us who care about the Bay and for our marine resources in Virginia. We're pleased to make this donation that will help move that work forward and ultimately protect our environment and better manage fisheries in the Bay."

Guy Harvey Ocean Research Foundation funds billfish research

Long time VIMS friend Dr. Guy Harvey, through his Guy Harvey Ocean Research Foundation, supported two important projects this year in professor John Graves' billfish program. A grant of \$47,200 helped Graves and Master's student Ben Marcek estimate post-release mortality of school size bluefin tuna released from the recreational troll fishery. Graves and Master's student Emily Loose used a grant of \$16,240 to investigate the movements and habitat use of white marlin and roundscale spearfish in the western North Atlantic.

Donors enjoy Poker Run



Commodore Connie Beltz of the Colonial Sail and Power Squadron (2nd from R) helped organize the second annual Dinghy Poker Run, which raised nearly \$3,000 for VIMS. From L: Bob Beltz, VIMS Associate Director of Development Jennifer Dillon, Connie Beltz, and VIMS Annual Fund and Volunteer Coordinator Mimi Beckwith. Pax River Sail and Power and Virginia Beach Sail and Power also supported the event.



Dominion officials presented their \$50,000 gift during a visit to the VIMS campus in Gloucester Point. From L: VIMS professor Rom Lipcius; VIMS Dean and Director John Wells; Pamela Faggert, Vice President and Chief Environmental Officer of Dominion Resources Services; VIMS graduate student Allison Colden, and Jennifer Kostyniuk, External Affairs Manager/ Dominion Virginia Power.



VIMS graduate student Emily Loose (standing) with a white marlin.

Garden Club dives into marine issues at VIMS

Members of the Garden Club of Virginia visited VIMS and the College of William and Mary as part of their statewide conservation forum, "Beneath the Surface." Speakers at the 52nd-annual event included VIMS professors Elizabeth Canuel, Emmett Duffy, and Carl Hershner, who explored science-based solutions that can help society—gardeners in particular—minimize human impacts on marine resources. The Garden Club of Virginia comprises 47 local clubs with more than 3,300 members around the Commonwealth.

Striped bass group supports disease research

A fundraiser organized by the non-profit conservation organization Stripers Forever has so far raised more than \$6,000 in support of research by VIMS professor Wolfgang Vogelbein into the causes and consequences of mycobacteriosis in striped bass.

Mycobacteriosis is an emerging infectious disease that affects well over 75 % of striped bass in Chesapeake Bay with unsightly skin ulcers and lesions in the internal organs. VIMS scientists first reported the disease in Bay stripers in 1997, and recently reported the first evidence that the disease is killing fish in the Bay. Mature stripers from the Bay can migrate as far north as Nova Scotia, thereby potentially impacting fisheries along the coast.

The funds are helping Vogelbein's team to address some of the many remaining questions concerning this troubling disease outbreak. They are using field-based modeling approaches to further study rates of mortality in the Bay and laboratory experiments to study disease transmission and the role of environmental factors. The Stripers Forever funding supports these disease-challenge experiments, which are taking place in VIMS' new state-of-the-art Seawater Research Laboratory.

Results of the research will allow more effective management strategies aimed at better protecting this vital fishery resource.

Program supports student research at Eastern Shore Lab

Support from the VIMS Council and local community members gave five college and high-school students from Virginia's Eastern Shore a unique opportunity to pursue marine research this summer at VIMS' Eastern Shore Laboratory in Wachapreague.

This year's interns were Lauren Rowan (Onancock), who studied the stress response and post-release survival of coastal sharks after capture on commercial long-line gear; Rebecca Turner (Onancock) who pursued Bay Scallop restoration in coastal bays; Woods Zember (Onley), who investigated the effects of clam aquaculture on water quality; Daniel Lassiter (Onley), who assisted with a collaborative study of summer flounder in the Mid-Atlantic Bight; and Jason Floyd (Machipongo), who helped to start rebuilding the reference collections of fish, invertebrates, and seaweeds that were destroyed when the lab's Seaside Hall was destroyed by fire in November 2010.

The ESL's summer intern program is supported through a subcommittee of the VIMS Council, chaired by A. Thomas Young, which for the third consecutive year raised the private funds needed for student support. Private donors are Marsha and Rick Amory, Cynthia Bailey, Chris and Kirkie Bosworth, Barbara and Steve Johnsen, the E. Polk Kellam Foundation, E. Polk Kellam, Jr. and Roberta Kellam, Caramine Kellam, Debbie and Pete Lalor, and Page and Tom Young. In addition, the H. M. Terry Seafood Co., Inc., and J. C. Walker Brothers, Inc., sponsored an internship focused on aquaculture research.

Intern Rebecca Turner says the program was "informative, fun, and extremely rewarding. I was able to learn all kinds of techniques whether by participating in field work, working in the lab, or analyzing data. I am extremely grateful for the opportunity to participate in a program that others can only dream of."

ESL Director Mark Luckenbach says "We are deeply thankful to our sponsors for giving students the opportunity to gain hands-on experience working with research scientists on real-world projects. The interns assist in a wide range of research and bring an infusion of enthusiasm to the lab. We hope to inspire some of them to pursue science careers and, through the generous support of donors, to continue this program in the coming years."



From L-R: ESL summer interns Daniel Lassiter, Woods Zember, Lauren Rowan, Rebecca Turner, and Jason Floyd

Summer Camps

Five weeklong summer camps gave 94 local children an opportunity for hands-on learning about Chesapeake Bay and its marine life. The camps—funded by an anonymous donor and led by Sarah McGuire, Education Coordinator for the Chesapeake Bay National Estuarine Research Reserve program at VIMS—reached students from 1st to 8th grade. This was the third year for the camps, which are funded to run through summer 2013. Applications to the 2011 camps were nearly double those of the previous year.



Summer campers enjoy a day on the water.

Dear Donor,
July 29, 2011
Thankyou so much for paying for this camp so that we could come + have this wonderful experience. I have had such a blast at this camp. I'll be back next year positive my best + favorite part was the Cedar Island. Including everything else. Thankyou for donating your money + time for us.
Love,
Morgan Booher

Dear Donor
Thank you for letting me come to Camp. I learned a lot about fish. I want to be a marine biologist so this will help with getting job at VIMS. I loved being at VIMS for my last time.

Thank you
Trevor Keener
Trevor Keener



Nichols creates student travel fellowship at VIMS

VIMS professor emeritus Maynard Nichols gave a gift of \$2,000 to support a fellowship for graduate students in the School of Marine Science at VIMS, and plans to continue the award annually. The fellowship will help selected students travel to conferences or workshops to share their research results with colleagues.

The initial recipient of the Nichols Student Travel Fellowship is Master's student Stephanie Salisbury, who used her share of the travel fund to attend the annual meeting of the American Society of Limnology and Oceanography (ASLO) in San Juan, Puerto Rico in February.

Nichols says the fellowship is "an important way to support VIMS' education program and its students—giving them experience in presenting and testing new results." Salisbury agrees, saying, "I was excited to attend this meeting because it was my first conference as a graduate student. Overall, I found the meeting incredibly inspiring and tremendously beneficial to my research as well as my scientific soul."

Maynard and his wife Mrs. Jane Nichols established the fellowship through the VIMS Foundation, a nonprofit 501 (c) (3) organization that supports VIMS' mission of education and research. Nichols says he ultimately plans to endow the fellowship through his estate plans.



Emeritus professor Maynard Nichols (L) with Stephanie Salisbury (C), inaugural winner of the Nichols Student Travel Fellowship, and Mrs. E. Jane Nichols (R)

VIMS Foundation Fellowships & Student Awards

Fellowships and awards for students in the School of Marine Science at VIMS recognize and reward qualities that lead to success in graduate school and subsequent careers—including commitment, initiative, scholarship, and interdisciplinary research.

Beazley Fellowship

Alison Deary Habitat differentiation, development of feeding apparatus, and sensory development during the ontogeny of larval sciaenids in Chesapeake Bay

Edward Holland Fellowship

Lori Sutter The effects of sea level rise on tidal marsh vegetation (York & Pamunkey Rivers, USA)

Gloucester Point Rotary Club Fellowship

Annie Murphy Evaluating the localized uptake and release of nitrogen in hard clam aquaculture agroecosystems

Anna Mosby Phytoplankton growth in the Ross Sea

Grey Allison & H. Renwick Dunlap Fellowship

Richard Secrist Food availability and utilization for cultured hard clams in Cherrystone Inlet, VA

Harry & Barbara Hager Fellowship

Megan Wood *Gracilaria vermiculophylla* as an emerging nursery habitat for juvenile blue crabs in the York River, VA

Allison Colden The influence of physical forcings on oyster population dynamics at multiple spatial scales

Juliette B. & Carroll W. Owens, Sr. Fellowship

Erin Jenkins Parasite biology in local crustacean populations

Rouse-Bottom Fellowship

Diane Tulipani Ecological role and conservation of the diamondback terrapin in Chesapeake Bay

SunTrust Fellowship

Emily Jayne Development of methods for quantifying the air-sea exchange of volatile organic carbon

Zeigler Fellowship

Jacob Spreitzer Geochemical controls on the partitioning of radium in sediments

Kathleen & Robert Roper, Jr. Fellowship

Julia Moriarty Formation and reworking of flood deposits on the Waipaoa River Shelf, New Zealand: Variability in sediment transport and deposition

VIMS Council Fellowship

Jenna Luek Using radium to determine groundwater flux and cycling of organic contaminants in subterranean estuaries

Jenna Spackeen Climate change and its effects on the stoichiometric relationship between nitrogen and phosphorus use by marine microbes and phytoplankton

VIMS Student Awards

John E. Olney Sr. Ichthyology Award
Alison Deary

Craig L. Smith Memorial Scholarship
Hadley McIntosh

Kelley Watson Fellowship
Anna Elizabeth Murphy

John M. and Marilyn Zeigler Student Achievement Award
Kersey Sturdivant

William J. Hargis Jr. Fellowship Award
Joshua Stone and Lauren Nys

Matthew Fontaine Maury Fellowship Award
Lindsey Kraatz

In Memoriam

It is with great sadness that VIMS notes the passing of these faculty and emeritus faculty members.



Rebecca M. Dickhut (1960-2011)

Professor Dickhut was an internationally recognized expert in the field of environmental science with a 22-year career at VIMS.



James E. Kirkley, Sr. (1946-2011)

Professor Kirkley was a pioneer in the analysis of fishery economics during his 24-year career at VIMS.



J. Ernest Warinner III (1925-2011)

Professor Warinner retired from VIMS in 1991 following a notable 30-year career studying the effects of chemical contaminants on marine life.



Dexter S. Haven (1918-2011)

Professor emeritus Dexter Haven was a pioneer in early shellfish studies in Chesapeake Bay, and lead author of what many consider the seminal paper on the Bay's oyster stock and fishery. He retired from VIMS in 1984 after 34 years of service.



Willard A. Van Engel (1915-2009)

Professor emeritus Willard A. Van Engel was a pioneer in Chesapeake Bay research and helped establish VIMS in the late 1940s. Professor Van Engel retired from VIMS in 1985 after 39 years of service.

Obituaries describing the many accomplishments of these noted individuals are available on the VIMS website.



VIMS Foundation Financial Statements

Statement of Financial Position June 30, 2011

Assets

Current Assets

Cash and Cash Equivalents	\$ 585,646
Pledges Receivable	<u>216,738</u>

Total Current Assets **802,384**

Investment in William and Mary Investment Trust **7,341,782**

Other Assets

Pledges Receivable	478,751
--------------------	---------

TOTAL ASSETS **\$ 8,622,917**

Liabilities and Net Assets

Liabilities

Grants Payable	\$ _____ -
----------------	------------

Net Assets

Unrestricted	947,947
Temporarily Restricted	2,856,519
Permanently Restricted	<u>4,818,451</u>

Total Net Assets **8,622,917**

TOTAL LIABILITIES AND NET ASSETS **\$ 8,622,917**

**The selected financial information presented was extracted from the financial statements audited by McPhillips, Roberts & Deans, PLC.*

VIMS Foundation

Financial Statements (Continued)

Statement of Activities for the Year Ended June 30, 2011

	Unrestricted	Temporarily Restricted	Permanently Restricted	Total
Revenue, Gains, and Other Support				
Contributions	\$ 112,376	\$ 579,236	\$ 384,183	\$ 1,075,795
Net Investment Income	<u>367,740</u>	<u>563,642</u>	<u>-</u>	<u>931,382</u>
	480,116	1,142,878	384,183	2,007,177
Net Assets Released from Restrictions	<u>491,697</u>	<u>(491,697)</u>	<u>-</u>	<u>-</u>
Total Revenue, Gains and Other Support	<u>971,813</u>	<u>651,181</u>	<u>384,183</u>	<u>2,007,177</u>
Expenses				
Program Services				
Instruction	94,189	-	-	94,189
Research	336,565	-	-	336,565
Academic Support	10,466	-	-	10,466
Institutional Support	73,817	-	-	73,817
Student Financial Assistance	50,477	-	-	50,477
Management and General	30,293	-	-	30,293
Fundraising	3,384	-	-	3,384
Total Expenses	<u>599,191</u>	<u>-</u>	<u>-</u>	<u>599,191</u>
Change in Net Assets	<u>372,622</u>	<u>651,181</u>	<u>384,183</u>	<u>1,407,986</u>
Net Assets, Beginning of Year	<u>575,325</u>	<u>2,205,338</u>	<u>4,434,268</u>	<u>7,214,931</u>
NET ASSETS, END OF YEAR	<u>\$ 947,947</u>	<u>\$ 2,856,519</u>	<u>\$ 4,818,451</u>	<u>\$ 8,622,917</u>

*The selected financial information presented was extracted from the financial statements audited by McPhillips, Roberts & Deans, PLC.

W&M Investment Trust

Another Solid Performance in 2011

The VIMS Foundation benefits from a larger investment pool by participating in the William and Mary Investment Trust (WAMIT) for its investable assets.

As of June 30, 2011, the consolidated endowment for the College was \$624.7 million—an increase from last year of \$85.1 million and a new watermark. Most of that gain came from a strong investment performance by WAMIT, which reported a \$54.2 million gain in its investment operations for fiscal year 2011 and a \$27.2 million increase in the value of funds held by others for the benefit of the College. Despite a challenging economic climate, WAMIT earned a commendable 14.6 % investment return. WAMIT's diversified complement of investment strategies and structures continues to deliver solid risk-adjusted returns over the long term under varying circumstances.

As of June 30, 2011, the WAMIT Investments Committee had oversight of approximately \$420 million in investable assets—87.9 % belonging to The College of William & Mary Foundation, 6.1 % to the Marshall-Wythe School of Law Foundation, 4.2 % to the William & Mary School of Business Foundation, and 1.8 % to the VIMS Foundation. Collectively, WAMIT investments represent approximately 67 % of the College's total endowment.

WAMIT performance is tied to the highly diversified active management structure of the portfolio. Domestic stocks, representing all cap sizes, make up 18.4 % of the portfolio—up 2.2 % from last year's June 30 weighting of 16.2 %. WAMIT's domestic equity managers returned a composite of 27.3 % for the year, underperforming the broad Russell 3000 Index and the larger cap S&P 500 Index, which returned 32.4 % and 30.7 %, respectively.

Foreign equity invested in developed regions of Europe, Asia, and North America (ex-U.S.), represented 10.5 % of the portfolio at June 30, up from last year's 9.1 % weighting. Investment performance was a strong 30.1 %, in line with the 30.3 % return of the MSCI World ex-U.S. Index benchmark. Investments in emerging markets, now at 8.0 % of the portfolio, produced a 15.3 % return, trailing the benchmark MSCI Emerging Markets Index of 28.2 %. Specific investments in the Asian Pacific markets and India contributed to underperformance against the benchmark.

Marketable Alternatives consist of two asset classes: Absolute Return and Special Situations. Investments in Absolute Return are designed to produce a positive return that would at a minimum equate to the yield of the CPI plus 5 %. Investments in Special Situations seek to maximize returns from temporary aberrations in market pricing. Each Absolute Return manager is structured as a hedge fund. As a group, these managers delivered 8.4 % in return in fiscal year 2011. Special Situations managers seek to exploit market dislocations in areas such as distressed credit and event arbitrage. Combined, these Special Situation strategies comprised 15 % of the portfolio and returned 11.8 %.

Together, Absolute Return and Special Situations comprised 36.2 % of the WAMIT portfolio at June 30. The blended return of these two strategies was 9.7 % for the year, exceeding the 8.6 % CPI plus 5 % benchmark.

Private equity,

consisting of buyouts and venture capital, constituted 6.6 % of total assets at June 30 against a targeted policy allocation of 8 %. Private equity had a 17.1 % return in 2011. WAMIT's long-term benchmark for private equity is the S&P 500 plus 5 %, reflecting what its managers perceive to be the opportunity cost in deviating from the public market. This benchmark returned 35.9 % for the year.

The fixed income portion of the portfolio returned 4.9 % for the fiscal year. This compares to the 3.9 % return of the Barclays Capital U.S. Aggregate Bond Index. In Real Assets, comprised of investments in commodities, natural resources, and equity real estate, WAMIT's strategies returned 9.5 %, outperforming the CPI plus 5 % benchmark of 8.6 %. At June 30 fixed income carried an 8.3 % weight in the portfolio, real assets a 7.8 % weight, and cash a 3.2 % weight with a corresponding amount slightly in excess of \$13.3 million.

All participants in WAMIT have the same exposure and access to asset classes and investment managers, and each is allowed to determine its own spending rate. A member of the VIMS Foundation Board is represented on the College of William and Mary Foundation Board. The Investments Committee members are all highly experienced investment managers who volunteer their time and expertise to assist the Investment Administration staff of the College of William and Mary in making strategic recommendations about asset allocation, investments, and managers.

Investment Results

As of June 30, 2011 - Net of Fees

	1 year	3 years	5 years
The William and Mary Investment Trust (WAMIT)	14.6%	3.1%	5.1%
Blended Benchmark	26.0%	3.8%	4.1%
Value Added	-11.4%	-0.7%	1.0%

Policy Benchmark: 60% Russell 3000 Index, 20% MSCI World ex-U.S. Index, 20% Barclays Capital Aggregate Bond Index

The William and Mary Investment Trust: Asset Allocation of Policy Portfolio

Fiscal year 2011

June 30, 2011 Allocation

Domestic Equities	18.4%
Foreign Equities	10.5%
Emerging Market Equities	8.0%
Fixed Income	8.3%
Absolute Return	21.1%
Special Situations	15.0%
Private Equity	6.6%
Real Assets	7.8%
Cash	3.2%
Distributed Securities	1.1%

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The Virginia Institute of Marine Science is proud to recognize the following individuals, corporations, and foundations that have generously supported its work with lifetime gifts of 100,000 or more

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The Maury Society

Named for the "Pathfinder of the Seas" Matthew Fontaine Maury, the Maury Society recognizes donors who make an annual gift of \$1,000 or more. This group of dedicated patrons helps VIMS to continue Maury's tradition of scientific discovery.

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VIMS Financials Fiscal year 2010-2011

Unaudited

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General Fund	18,612,951
Nongeneral Funds	
Tuition and Other Funds	1,759,741
Federal Stimulus	2,704,790
Sponsored Programs*	18,609,523
Private Funds**	809,449
Total Revenue	\$42,496,454

EXPENDITURES

Instruction	\$1,554,619
Research and Advisory Services	9,844,888
Academic Support	4,626,656
Institutional Support	3,273,728
Plant Operations	3,796,015
Student Financial Assistance	791,025
Sponsored Programs	18,609,523
Total Expenditures	\$42,496,454

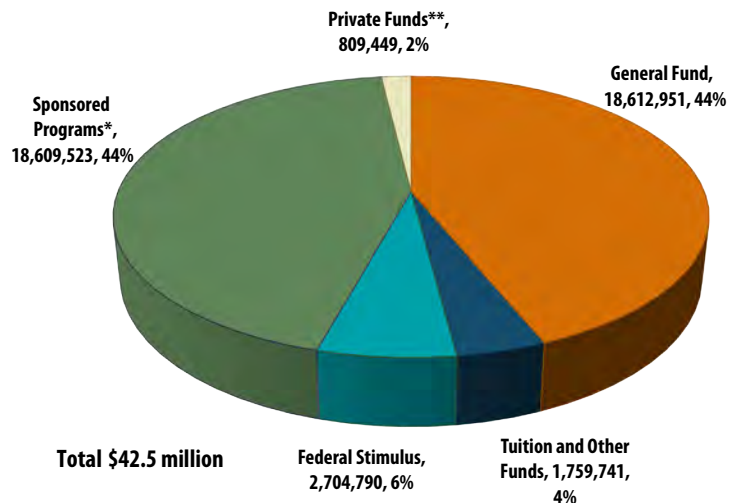
CAPITAL EXPENDITURES

\$4,939,777

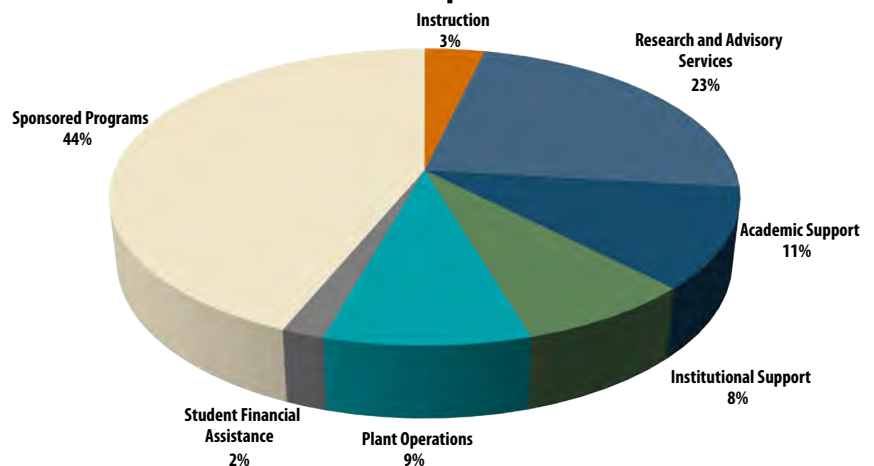
*Sponsored Programs revenue includes Grant & Contract expended revenues.

**Private funds revenue includes program support to VIMS from the VIMS Foundation.

FY 2010-11 Revenue



FY 2010-11 Expenditures



Total \$42.5 million

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Lukens House (1904)



Raleigh House (1948)



Franklin Hall (1970)



From the Past...

VIMS demolished a number of older buildings on its Gloucester Point campus as part of an overall plan to become "greener" and more energy efficient.

Campus Master Plan



To the Future...

White House (1935)



Holben House (1924)



Stevenson House (1870)



Virginia Institute of Marine Science
College of William and Mary
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Save the Date

Marine Science Day Open House - May 19, 2012



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